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VIKING PROJECT

The most significant fact about the Viking Mission in 1980 is that it was still active, after producing more information about Mars than all previous observations combined. Of the four Viking spacecraft that began observing Mars in the summer of 1976, two were still operating in 1980, and one has been programmed to continue transmitting data to December 1994. The mission of two orbiters and two landers was originally designed for only 90 days!

The one spacecraft still active, Viking Lander 1, has made surface pressure observations that reveal a dramatic amplification of the global-scale atmospheric tidal components during great dust storms on Mars. At the time of the storms in 1977, absorption of solar radiation by airborne dust produced an enormous thermal tidal forcing.

A newly developed model can infer the effective opacity of the haze during the great dust storms by choosing that opacity which reproduces the amplitude of the twice daily surface pressure oscillation observed at Viking Lander 1. The model simulation of past storms is remarkably good. Future episodes of Martian great dust storms can be monitored as Lander 1 continues to measure pressure.

From November 1979 to July 1980, Orbiter 1 took more than 7000 pictures. Some 2770 of them filled in the remaining gaps in the medium-resolution mapping of the planet's surface. Not even considered in the original Viking planning, this program provided the data base from which the U.S. Geological Survey is generating a new set of Mars maps at 2.5 times the scale of the Mariner 9 maps.

The orbiter's infrared measurements of temperature and water vapor abundance continued at a low level. Its radio systems continued to measure the Earth-Mars distance, the Martian gravitational field, radius, and atmosphere. Finally, its attitude control gas was exhausted and its transmitter was turned off on August 7 after it had made 1488 orbits of Mars.

The lander mission during 1980 was also restricted to photography, meteorological measurements, and radio science. Lander 2's last transmission was on April 11 after its batteries had degraded to the point where it could no longer support the power requirements.

Lander 1 continues to acquire data automatically, transmitting weekly to Earth if enabled by a signal from the Deep Space Network. Viking Orbiter 2 was shut down July 24, 1978, after running out of attitude control gas.

The data obtained from the two landers and Orbiter 1 in 1980 has been of excellent quality. The magnitude of their contribution to our understanding of Mars will become known in the future. Few of the pictures have yet to be processed, and the data analysis is in its early stages.

Figure (*opposite page*): This photomosaic of the Mangala Vallis region of Mars was taken by Viking Orbiter 1 on three successive days, June 19-21, 1980, commemorating the fourth anniversary of Viking 1's arrival at Mars. The pictures were taken at a range of 1600 kilometers. The geologically varied region lies southwest of Olympus Mons near the Martian equator and contains vast channel systems that appear to have been carved by running water in the distant past.